



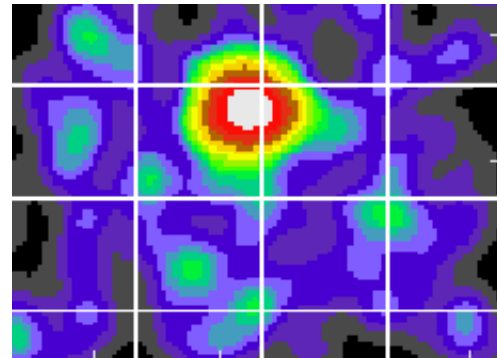
[News in Science](#)

News in Science 6/3/2003 Gamma ray bursts may be driven by two engines

[This is the print version of story <http://www.abc.net.au/science/news/stories/s799311.htm>]

Two different kinds of event may cause the massive and mysterious flashes known as gamma ray bursts that bathe the universe in intense radiation before disappearing, astronomers have proposed.

Based on a new analysis of nearly 2,000 of these brief but extremely intense flashes - among the most powerful explosions known since the Big Bang - suggests that the two major varieties of burst have different origins, the team said in a report to be published in the journal [Astronomy & Astrophysics](#).



The X-ray afterglow of a gamma ray burst in 1997 (Pic: NASA)

"It is suspected that, either way, with each gamma-ray burst, we wind up with a brand new black hole," said Professor Peter Meszaros of [Pennsylvania State University](#) in the U.S., a member of the team.

Scientists simply don't know what causes gamma ray bursts, intense light flashes more than a million trillion times as bright as our Sun. They were first detected by chance in 1967 with orbiting U.S. military satellites deployed to monitor nuclear explosions on the Earth's surface.

Thousands of bursts since have been logged since - on average, about once a day - but what they are, how far away they are and why they occur remain one of biggest mysteries in astronomy. Despite their intensity, they are difficult to study because they happen at random, and are so brief - between a tiny fraction of second and a few hundred seconds - then rapidly disappear.

The team's analysis revealed previously unrecognised discrepancies in the light patterns of short or longer bursts - those lasting either less or more than two seconds. They examined the fluence - the total energy of all the photons emitted by a burst during its active stage - and its duration, in all of the bursts.

They discovered a new relationship: a correlation between the length of the burst and the intensity of fluence: the longer the burst, the greater the fluence. However, the degree of this relationship was statistically different for the two types of burst, suggesting that they operate under different physical constraints.

It thus seems unlikely that the same 'engine' could produce both types of bursts, argued the team of Hungarian, American and Czech astronomers. Short bursts, for example, could come from an engine that is less efficient in converting energy into gamma rays. It had been unclear

whether the two types of bursts are produced by essentially the same objects with different behaviours, or different objects with similar behaviour.

"We can now say, with a high degree of statistical certainty, that the two show a different physical behaviour," says team leader Dr Lajos Balazs of the [Konkoly Observatory](#) in Budapest.

The new finding lends support to a growing consensus that longer gamma ray bursts originate from fantastic explosions of stars over 30 times more massive than the Sun, the researchers say.

It had been suggested that short bursts result from the fiery collision of neutron stars, black holes, or both, or even some unknown type of behaviour of matter and energy that occurs during such events.

The fact that gamma ray bursts come from all different directions of the sky points to their origins being outside our own galaxy, the Milky Way, and in the distant reaches of the universe.

The 1,972 bursts were observed by the BATSE instrument on the NASA's orbiting Compton Gamma Ray Observatory, a mission active between 1991 and 2000. Further insights are expected from three instruments aboard NASA's upcoming [Swift Gamma-ray Burst Explorer](#) satellite mission to be launched later this year.

[Bob Beale - ABC Science Online](#)

More Info?

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[Mysterious new gamma rays found, News in Science 24 Mar 2000](#)

[Astronomers see small big bang, News in Science 29 Mar 1999](#)

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